SOME EFFECTS OF SURFACE SLOPE ON CLIMATE.

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In a mountainous agricultural region it is usual to find great variations in the advancement of the seasons, as shown by the differing stages of crop and general vegetation development, even along the same parallel of latitude, because of the wide differences in exposure and elevation presented. It is interesting to note that in many Utah valleys, neighborhoods within a very few miles of each other and differing only a few hundred feet in elevation have climates so different as to make the stages of common crop growth several weeks apart.

The cultivated portion of the Salt Lake Valley south of Salt Lake City is about 10 miles wide, having an altitude along the Jordan River of about 4,250 feet above sea level. From here the ground rises gradually toward the east to the Wasatch Mountains, and toward the west to the Oquirrh Mountains, where the agricultural lands merge into the foothills at an average altitude of about 4,450 feet, or a total rise of about 200 feet in something less than 5 miles. In fact the valley floor in places is so wide and flat as to confine this rise to within approximately 2 miles.

Such is the case between Wandamere, a suburb of Salt Lake City about 5 miles south and 1 mile east of the center of the city, and East Mill Creek, a community next to the Wasatch foothills, 2 miles nearly due east of Wandamere. The general conditions noted along the slope between these two places prevail on the same slope to the southward for a distance of 10 or 12 miles, and also across the valley toward the west, on the slope up to the Oquirrh Mountains; therefore the data gathered from an examination of the East Mill Creek to Wandamere slope may be safely assumed to apply in a general way to the entire valley.

As shown by the berry vines and tree fruits the East Mill Creek springtime is on the average about two weeks in advance of the season of the lower neighbor, Wandamere. This anomaly exists primarily because the growth of vine and tree crops is dependent principally on the temperature of the atmosphere, and not so much on the temperature of the soil. But fundamentally this dissimilarity in climate has its birth in the nightly transferrence of air from the mountain to the valley by air drainage.

The draining of the cool air nightly into the Wandamere bottoms causes the accumulation of spring temperatures to lag; that is, the mean temperature for the 24 hours is lower than at East Mill Creek. This condition causes an appreciable lethargy in the opening of the fruit and berry blossoms at Wandamere; and the orchards at East Mill Creek, which lie well above the level to which the cold imported air usually fills, get an average of two weeks' start, because their nighttime temperatures average higher, thus giving a greater accumulation of growing temperatures in the same length of time.

The height to which the accumulated cold air extends up the slope each night varies constantly, probably ranging from an inappreciably small distance to as far as the East Mill Creek district itself under favorable conditions; therefore orchards along the slope show progressively and quite regularly the change from the Wandamere to the East Mill Creek conditions.

The slope is a very gradual and even one, therefore the 200-foot rise, representing two weeks' difference in the season, may be fairly accurately divided into units of one day earlier for fruit for each 14 feet of rise from Wandamere toward East Mill Creek.

The daily march of normal temperatures in the spring at Salt Lake City is at the rate of about 1 degree rise in every three days; and from this information the direct deduction is made that the 14-foot rise in elevation, equaling one day's advance in fruit, is therefore equivalent to one-third of a Fahrenheit degree increase in the daily mean temperature. The total difference in the daily spring mean temperatures between East Mill Creek and Wandamere, calculated on this basis, is, therefore, 4⅔° Fahrenheit. But since temperature records are available at neither of these places this figure must remain as purely a deduction at present.

Thus from natural necessity truck and vegetable fields are spread over the lowlands of the Salt Lake Valley, while the higher slopes are covered with fruit trees and berry vines.